COMPUTER ENGINEERING, BS

for the degree of Bachelor of Science in Computer Engineering

Computer Engineering is a blooming discipline focused on the development of vital computing technologies that range from chips to computers to networks to programming tools and key algorithms. Fundamentally, Computer Engineering addresses the problem of building scalable, trustworthy computing systems and applications, and the faculty's interests span a broad spectrum of issues pertinent to this theme. Computer engineering has taken the lead in revolutionizing many science and engineering disciplines with parallel computing, from chips to clouds to planet-scale critical infrastructures, and has defined new standards of security, privacy, and dependability for systems ranging from small circuits to the electric power grids of many nations. Students need a broad and sound set of mathematical and computing skills and are well-served by a flexible curriculum that enables them to pursue topics of interest among the many subdisciplines in computing.

The computer engineering core curriculum focuses on fundamental computer engineering knowledge: circuits, systems, electromagnetics, computer systems, electronics for information processing and communication, and computer science. The rich set of ECE elective courses permits students to concentrate in any sub-discipline of computer engineering including hardware systems; cyberphysical systems; foundations and theory; software and languages; algorithms and mathematical tools; trust, reliability, security; networking, mobile and distributed computing; big data analytics and systems; AI, machine learning, robotics, cybernetics.

Current Program Educational Objectives

for the degree of Bachelor of Science in Computer Engineering

Graduation Requirements

Minimum Technical GPA (https://go.grainger.illinois.edu/TechnicalGPA/): 2.0
TGPA is required for ECE courses (except ECE 316). See **Technical GPA (https://go.grainger.illinois.edu/TechnicalGPA/)** to clarify requirements.

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. ECE 445 or combination of ECE 496 & ECE 499 satisfies a design elective and the Campus General Education Advanced Composition requirement.

Orientation and Professional Development

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300 instead.)	1
Total Hours		**1**

Foundational Mathematics and Science

Code	Title	Hours
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
or MATH 416	Abstract Linear Algebra	
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		**29**

Computer Engineering Technical Core

Code	Title	Hours
ECE 110	Introduction to Electronics	3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
ECE 220	Computer Systems & Programming	4
CS 173	Discrete Structures (MATH 213 may be substituted.)	3
CS 225	Data Structures	4
ECE 313	Probability with Engrg Applic (STAT 410 may be substituted.)	3
ECE 374	Introduction to Algorithms & Models of Computation	4
ECE 385	Digital Systems Laboratory	3
ECE 391	Computer Systems Engineering	4
Total Hours		**36**

Technical Electives

Code	Title	Hours
From the Departmentally Approved List of Technical Electives (below) to include: at least 1 Electrical Engineering Foundations course, at least 3 Advanced Computing Electives, at least 1 Design Elective.		**30**
AE 202	Aerospace Flight Mechanics	3
AE 302	Aerospace Flight Mechanics II	3
AE 311	Incompressible Flow	3
AE 312	Compressible Flow	3
AE 321	Mechs of Aerospace Structures	3
AE 352	Aerospace Dynamical Systems	3
AE 353	Aerospace Control Systems	3
AE 402	Orbital Mechanics	3 or 4
AE 403	Spacecraft Attitude Control	3 or 4
AE 410	Computational Aerodynamics	3 or 4
AE 412	Viscous Flow & Heat Transfer	4
AE 416	Applied Aerodynamics	3 or 4
AE 419	Aircraft Flight Mechanics	3 or 4

AE 420	Finite Element Analysis	3 or 4
AE 428	Mechanics of Composites	3
AE 433	Aerospace Propulsion	3 or 4
AE 434	Rocket Propulsion	3 or 4
AE 435	Electric Space Propulsion	3 or 4
AE 451	Aeroelasticity	3 or 4
AE 460	Aerodynamics & Propulsion Lab	2

Agri. Bio Eng. (ABE): all 300 and 400 level courses except 440. Exceptions for seminars and special topics will be reviewed in Advising Office.

ASTR 210	Introduction to Astrophysics	3
ASTR 310	Computing in Astronomy	3
ASTR 330	Extraterrestrial Life	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3
ASTR 404	Stellar Astrophysics	3
ASTR 405	Planetary Systems	3
ASTR 406	Galaxies and the Universe	3
ASTR 414	Astronomical Techniques	4
ATMS 201	General Physical Meteorology	3
ATMS 301	Atmospheric Thermodynamics	3
ATMS 302	Atmospheric Dynamics I	3
ATMS 303	Synoptic-Dynamic Wea Analysis	4
ATMS 304	Radiative Transfer-Remote Sens	3
ATMS 305	Computing and Data Analysis	3
ATMS 404	Risk Analysis in Earth Science	3 or 4
ATMS 405	Boundary Layer Processes	4
ATMS 406	Tropical Meteorology	4
ATMS 410	Radar Remote Sensing	4
ATMS 411	Satellite Remote Sensing	4
ATMS 420	Atmospheric Chemistry	4
ATMS 421	Earth Systems Modeling	4
ATMS 447	Climate Change Assessment	3
ATMS 449	Biogeochemical Cycles	4
BIOC 406	Gene Expression & Regulation	3
BIOC 446	Physical Biochemistry	3
BIOC 455	Technqs Biochem & Biotech	4
BIOE 201	Conservation Principles Bioeng	3
BIOE 202	Cell & Tissue Engineering Lab	2
BIOE 302	Modeling Human Physiology	3
BIOE 414	Biomedical Instrumentation	3
BIOE 415	Biomedical Instrumentation Lab	2
BIOE 461	Cellular Biomechanics	4
BIOE 467	Biophotonics	3
BIOE 476	Tissue Engineering	3
BIOE 480	Magnetic Resonance Imaging	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4

Biophysics (BIOP): All 400 level courses except seminars and special topics, which may be reviewed in the Advising Office

CHBE 221	Principles of CHE	3
CHBE 321	Thermodynamics	4
CHBE 421	Momentum and Heat Transfer	4
CHBE 422	Mass Transfer Operations	4
CHBE 424	Chemical Reaction Engineering	3
CHBE 430	Unit Operations Laboratory	4
CHBE 431	Process Design	4
CHBE 440	Process Control and Dynamics	3
CHBE 451	Transport Phenomena	3
CHBE 452	Chemical Kinetics & Catalysis	3
CHBE 453	Electrochemical Engineering	2 or 3
CHBE 456	Polymer Science & Engineering	3
CHBE 471	Biochemical Engineering	3 or 4
CHBE 472	Techniques in Biomolecular Eng	3 or 4
CHBE 473	Biomolecular Engineering	3 or 4
CHBE 474	Metabolic Engineering	3 or 4
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1

Chemistry (CHEM): All 200, 300 and 400 level courses except 397, 497, 499, and seminars and special topics, which may be reviewed in the Advising Office

CEE 310	Transportation Engineering	3
CEE 330	Environmental Engineering	3
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 430		
CEE 447	Atmospheric Chemistry	4
CEE 491	Decision and Risk Analysis	3 or 4
CPSC 265	Genetic Engineering Lab	3
CS 101	Intro Computing: Engrg & Sci (By Approval)	3
CS 242	Programming Studio	3
CS 357	Numerical Methods I	3
CS 410	Text Information Systems	3 or 4
CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 413	Intro to Combinatorics	3 or 4
CS 414	Multimedia Systems	3 or 4
CS 416	Data Visualization	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4
CS 422	Programming Language Design	3 or 4
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4
CS 427	Software Engineering I	3 or 4
CS 428	Software Engineering II	3 or 4
CS 429	Software Engineering II, ACP	3
CS 431	Embedded Systems	3 or 4
CS 433	Computer System Organization	3 or 4

CS 435	Cloud Networking	3 or 4	ECE 418	Image & Video Processing	4
CS 436	Computer Networking Laboratory	3 or 4	ECE 419	Security Laboratory	3 or 4
CS 438	Communication Networks	3 or 4	ECE 420	Embedded DSP Laboratory	2
CS 439	Wireless Networks	3 or 4	ECE 422	Computer Security I	4
CS 440	Artificial Intelligence	3 or 4	ECE 424	Computer Security II	3 or 4
CS 445	Computational Photography	3 or 4	ECE 425	Intro to VLSI System Design	3
CS 446	Machine Learning	3 or 4	ECE 428	Distributed Systems	3 or 4
CS 447	Natural Language Processing	3 or 4	ECE 431	Electric Machinery	4
CS 450	Numerical Analysis	3 or 4	ECE 432		
CS 460	Security Laboratory	3 or 4	ECE 435	Computer Networking Laboratory	3 or 4
CS 461	Computer Security I	4	ECE 437	Sensors and Instrumentation	3
CS 463	Computer Security II	3 or 4	ECE 438	Communication Networks	3 or 4
CS 465	User Interface Design	4	ECE 439	Wireless Networks	3 or 4
CS 466	Introduction to Bioinformatics	3 or 4	ECE 441	Physcs & Modeling Semicond Dev	3
CS 467	Social Visualization	3 or 4	ECE 442	Silicon Photonics	3 or 4
CS 473	Algorithms	4	ECE 443	LEDs and Solar Cells	4
CS 475	Formal Models of Computation	3 or 4	ECE 444	IC Device Theory & Fabrication	4
CS 476	Program Verification	3 or 4	ECE 445	Senior Design Project Lab	4
CS 477	Formal Software Development Methods	3 or 4	ECE 446	Principles of Experimental Research in Electrical Engineering	4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4	ECE 447	Active Microwave Ckt Design	3
CS 484	Parallel Programming	3 or 4	ECE 448	Artificial Intelligence	3 or 4
CS 398	Special Topics (As approved)	1 to 4	ECE 451	Adv Microwave Measurements	3
CS 498	Special Topics (As approved)	1 to 4	ECE 452	Electromagnetic Fields	3
ECE 297	Individual Study	1	ECE 453	Wireless Communication Systems	4
ECE 304	Photonic Devices	3	ECE 454	Antennas	3
ECE 307	Techniques for Engrg Decisions	3	ECE 455	Optical Electronics	3 or 4
ECE 310	Digital Signal Processing	3	ECE 456	Global Nav Satellite Systems	4
ECE 311	Digital Signal Processing Lab	1	ECE 457	Microwave Devices & Circuits	3
ECE 314	Probability in Engineering Lab	1	ECE 458	Applic of Radio Wave Propag	3
ECE 329	Fields and Waves I	3	ECE 459	Communications Systems	3
ECE 330	Power Ckts & Electromechanics	3	ECE 460	Optical Imaging	4
ECE 333	Green Electric Energy	3	ECE 461	Digital Communications	3
ECE 340	Semiconductor Electronics	3	ECE 462	Logic Synthesis	3
ECE 342	Electronic Circuits	3	ECE 463	Digital Communications Lab	2
ECE 343	Electronic Circuits Laboratory	1	ECE 464	Power Electronics	3
ECE 350	Fields and Waves II	3	ECE 465		
ECE 365	Data Science and Engineering	3	ECE 466		
ECE 380	Biomedical Imaging	3	ECE 467	Biophotonics	3
ECE 395	Advanced Digital Projects Lab	2 or 3	ECE 468	Optical Remote Sensing	3
ECE 396	Honors Project	1 to 4	ECE 469	Power Electronics Laboratory	2
ECE 397	Individual Study in ECE	0 to 4	ECE 470	Introduction to Robotics	4
ECE 402	Electronic Music Synthesis	3	ECE 472	Biomedical Ultrasound Imaging	3
ECE 403	Audio Engineering	3	ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 407	Cryptography	3 or 4	ECE 476	Power System Analysis	3
ECE 408	Applied Parallel Programming	4	ECE 478	Formal Software Development Methods	3 or 4
ECE 411	Computer Organization & Design	4	ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 412			ECE 481	Nanotechnology	4
ECE 414	Biomedical Instrumentation	3	ECE 482	Digital IC Design	3
ECE 415	Biomedical Instrumentation Lab	2	ECE 483	Analog IC Design	3
ECE 416	Biosensors	3	ECE 485		
ECE 417	Multimedia Signal Processing	4	ECE 486	Control Systems	4

ECE 487	Intro Quantum Electr for EEs	3
ECE 488	Compound Semicond & Devices	3
ECE 489	Robot Dynamics and Control	4
ECE 490	Introduction to Optimization	3 or 4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
ECE 493	Advanced Engineering Math	3 or 4
ECE 495	Photonic Device Laboratory	3
ECE 496	Senior Research Project	2
ECE 499	Senior Thesis	2
ECE 298	Special Topics (As approved)	0 to 4
ECE 398	Special Topics in ECE (As approved)	0 to 4
ECE 498	Special Topics in ECE (As approved)	1 to 4
ENG 491	Interdisciplinary Design Proj (CubeSat, Solar Decathlon, Formula SAE, Baja SAE or by approval)	1 to 4
GEOL 107	Physical Geology	4
GEOL 208	History of the Earth System	4
GEOL 333	Earth Materials and the Env	4
GEOL 380	Environmental Geology	4
GEOL 411	Structural Geol and Tectonics	4
GEOL 417	Geol Field Methods, Western US	6
GEOL 432	Mineralogy and Mineral Optics	4
GEOL 436	Petrology and Petrography	4
GEOL 440	Sedimentology and Stratigraphy	4
GEOL 450	Investigating the Earth's Interior	3
GEOL 452	Introduction to Geophysics	4
GEOL 460	Geochemistry	3
IE 310	Deterministic Models in Optimization	3
IE 330	Industrial Quality Control	3
IE 360	Facilities Planning and Design	3
IE 361	Production Planning & Control	3
IE 400	Design & Anlys of Experiments	3 or 4
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4
IE 411	Optimization of Large Systems	3 or 4
IE 412	OR Models for Mfg Systems	3 or 4
IE 413	Simulation	3 or 4
IE 420	Financial Engineering	3 or 4
IE 430	Economic Found of Quality Syst	3 or 4
IE 431	Design for Six Sigma	3
IB 150	Organismal & Evolutionary Biol	4
IB 202	Physiology	3 or 4
IB 203	Ecology	4
IB 204	Genetics	3 or 4
IB 302	Evolution	4
IB 335		
IB 348	Fish and Wildlife Ecology	3
IB 368	Vertebrate Natural History	4
IB 401	Introduction to Entomology	3 or 4
IB 405	Evolution of Traits and Genomes	3
IB 420	Plant Physiology	3
IB 421	Photosynthesis	3

IB 426	Env and Evol Physl of Animals	3
IB 427		
IB 431	Behavioral Ecology	3
IB 432	Genes and Behavior	3
IB 440	Plants and Global Change	3
IB 444	Insect Ecology	3 or 4
IB 451	Conservation Biology	4
IB 452	Ecosystem Ecology	3
IB 453	Community Ecology	3
IB 461	Ornithology	4
IB 462	Mammalogy	4
IB 463	Ichthyology	4
IB 464	Herpetology	4
IB 467	Principles of Systematics	4
IB 468	Insect Classification and Evol	4
IB 471	Fungal Diversity and Ecology	4
IB 472		
IB 473		
IB 481	Vector-borne Diseases	4
IB 482	Insect Pest Management	3
LING 300	Anat & Physiol Spch Mechanism	4
LING 406	Introduction to Computational Linguistics	3 or 4
LING 407	Logic and Linguistic Analysis	3 or 4
LING 427	Language and the Brain	3 or 4
MSE 280	Engineering Materials	3
Material Science and Engineering (MSE): All 300 and 400 level courses except 304, 460, 461, and seminars/special topics, which may be reviewed by the Advising Office		
MATH 347	Fundamental Mathematics	3
MATH 357	Numerical Methods I	3
MATH 402	Non Euclidean Geometry	3 or 4
MATH 403	Euclidean Geometry	3 or 4
MATH 412	Graph Theory	3 or 4
MATH 413	Intro to Combinatorics	3 or 4
MATH 414	Mathematical Logic	3 or 4
MATH 417	Intro to Abstract Algebra	3 or 4
MATH 418	Intro to Abstract Algebra II	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 424	Honors Real Analysis	3
MATH 425	Honors Advanced Analysis	3
MATH 427	Honors Abstract Algebra	3
MATH 428	Honors Topics in Mathematics	3
MATH 432	Set Theory and Topology	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 448	Complex Variables	3 or 4
MATH 450	Numerical Analysis	3 or 4
MATH 453	Number Theory	3 or 4
MATH 473	Algorithms	4
MATH 475	Formal Models of Computation	3 or 4

MATH 481	Vector and Tensor Analysis	3 or 4
MATH 482	Linear Programming	3 or 4
MATH 484	Nonlinear Programming	3 or 4
MATH 487	Advanced Engineering Math	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4
MCB 150	Molec & Cellular Basis of Life	4
MCB 250	Molecular Genetics	3
MCB 251	Exp Techniqs in Molecular Biol	2
MCB 252	Cells, Tissues & Development	3
MCB 253	Exp Techniqs in Cellular Biol	2
MCB 300	Microbiology	3
MCB 301	Experimental Microbiology	3
MCB 314	Introduction to Neurobiology	3
MCB 316	Genetics and Disease	4
MCB 354	Biochem & Phys Basis of Life	3
MCB 400	Cancer Cell Biology	3
MCB 401	Cellular Physiology	3
MCB 402	Sys & Integrative Physiology	3
MCB 403		
MCB 404		
MCB 406	Gene Expression & Regulation	3
MCB 408	Immunology	3
MCB 410	Developmental Biology, Stem Cells and Regenerative Medicine	3
MCB 413	Endocrinology	3
MCB 419	Brain, Behavior & Info Process	3
MCB 421	Microbial Genetics	3
MCB 424	Microbial Biochemistry	3
MCB 426	Bacterial Pathogenesis	3
MCB 430	Molecular Microbiology	3
MCB 431	Microbial Physiology	3
MCB 433	Virology & Viral Pathogenesis	3
MCB 435	Evolution of Infectious Disease	3
MCB 446	Physical Biochemistry	3
MCB 480	Eukaryotic Cell Signaling	3
ME 200	Thermodynamics	3
ME 310	Fundamentals of Fluid Dynamics	4
ME 320	Heat Transfer	4
ME 330	Engineering Materials	4
ME 340	Dynamics of Mechanical Systems	3.5
ME 370	Mechanical Design I	3
ME 371	Mechanical Design II	3
ME 400	Energy Conversion Systems	3 or 4
ME 401	Refrigeration and Cryogenics	3 or 4
ME 402	Design of Thermal Systems	3 or 4
ME 403	Internal Combustion Engines	3 or 4
ME 404	Intermediate Thermodynamics	4
ME 410	Intermediate Gas Dynamics	3 or 4
ME 411	Viscous Flow & Heat Transfer	4
ME 412	Numerical Thermo-Fluid Mechs	2 to 4
ME 420	Intermediate Heat Transfer	4
ME 430	Failure of Engrg Materials	3 or 4

ME 431	Mechanical Component Failure	3 or 4
ME 440	Kinem & Dynamics of Mech Syst	3 or 4
ME 445	Introduction to Robotics	4
ME 451	Computer-Aided Mfg Systems	3 or 4
ME 452	Num Control of Mfg Processes	3 or 4
ME 460	Industrial Control Systems	4
ME 461	Computer Cntrl of Mech Systems	3 or 4
ME 471	Finite Element Analysis	3 or 4
ME 472	Introduction to Tribology	3 or 4
ME 485		
ME 487	MEMS-NEMS Theory & Fabrication	4
MUS 407	Elect Music Techniques I	3
MUS 409	Elec Music Techniques II	2
NEUR 453	Cog Neuroscience of Vision	3 or 4
NPRE 201	Energy Systems	2 or 3
NPRE 247	Modeling Nuclear Energy System	3
NPRE 330	Materials in Nuclear Engineering	3
NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 421	Plasma and Fusion Science	3
NPRE 423	Plasma Laboratory	2
NPRE 429	Plasma Engineering	3
NPRE 432	Nuclear Engrg Materials Lab	2
NPRE 435	Radiological Imaging	3
NPRE 441	Radiation Protection	4
NPRE 442	Radioactive Waste Management	3
NPRE 448	Nuclear Syst Engrg & Design	4
NPRE 451	NPRE Laboratory	3
NPRE 455	Neutron Diffusion & Transport	4
NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 458	Design in NPRE	4
NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 475	Wind Power Systems	3 or 4
PHYS 225	Relativity & Math Applications	2
PHYS 325	Classical Mechanics I	3
PHYS 326	Classical Mechanics II	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	3 or 4
PHYS 403	Modern Experimental Physics	4 or 5
PHYS 406	Acoustical Physics of Music	4
PHYS 419	Space, Time, and Matter-ACP	3 or 4
PHYS 420	Space, Time, and Matter	2
PHYS 427	Thermal & Statistical Physics	4
PHYS 460	Condensed Matter Physics	4
PHYS 466	Atomic Scale Simulations	3 or 4
PHYS 470	Subatomic Physics	4
PHYS 485	Atomic Phys & Quantum Theory	3
PHYS 486	Quantum Physics I	4
PHYS 487	Quantum Physics II	4
PSYC 204	Intro to Brain and Cognition	3
SHS 200	General Phonetics	3
SHS 240	Intro Sound & Hearing Science	3

SHS 300	Anat & Physiol Spch Mechanism	4
SHS 301	General Speech Science	4
SHS 320	Development of Spoken Language	3
SHS 450	Intro Audiol & Hear Disorders	4
SHS 470	Neural Bases Spch Lang	3
STAT 420	Methods of Applied Statistics	3 or 4
STAT 424	Design of Experiments	3 or 4
STAT 425	Statistical Modeling I	3 or 4
STAT 428	Statistical Computing	3 or 4
STAT 429	Time Series Analysis	3 or 4
STAT 440	Statistical Data Management	3 or 4
SE 411	Reliability Engineering	3 or 4
SE 420	Digital Control Systems	4
SE 423	Mechatronics	3
SE 424	State Space Design for Control	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
TAM 324	Behavior of Materials	4
TAM 335	Introductory Fluid Mechanics	4
TAM 412	Intermediate Dynamics	4
TAM 435	Intermediate Fluid Mechanics	4
TAM 445	Continuum Mechanics	4
TAM 451	Intermediate Solid Mechanics	4
Select one course from the following list of Electrical Engineering Foundations Courses:		
ECE 310	Digital Signal Processing	3
ECE 330	Power Ckts & Electromechanics	3
ECE 329	Fields and Waves I	3
ECE 340	Semiconductor Electronics	3
ECE 461	Digital Communications	3
ECE 486	Control Systems	4
Select three courses from the following list of Advanced Computing Electives:		
CS 357	Numerical Methods I	3
CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 414	Multimedia Systems	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4
CS 431	Embedded Systems	3 or 4
CS 434	Real World Algorithms for IoT and Data Science	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 437	Topics in Internet of Things	3 or 4
CS 438	Communication Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4

CS 441	Applied Machine Learning	3 or 4
CS 444	Deep Learning for Computer Vision	3 or 4
CS 446	Machine Learning	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 461	Computer Security I	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 483	Applied Parallel Programming	4
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412		
ECE 419	Security Laboratory	3 or 4
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 435	Computer Networking Laboratory	3 or 4
ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4
ECE 448	Artificial Intelligence	3 or 4
ECE 462	Logic Synthesis	3
ECE 470	Introduction to Robotics	4
ECE 478	Formal Software Development Methods	3 or 4
ECE 479	IoT and Cognitive Computing	4
ECE 484	Principles of Safe Autonomy	4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
Select one course from departmentally approved Design Elective list below:		
ECE 411	Computer Organization & Design	4
ECE 445	Senior Design Project Lab	4
ECE 496 & ECE 499	Senior Research Project and Senior Thesis	4

Free Electives

Code	Title	Hours
Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree. (https://go.grainger.illinois.edu/FreeElectives/)		16
Total Hours of Curriculum to Graduate		**128**

for the degree of Bachelor of Science in Computer Engineering

Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence. The

curriculum sequence can also be viewed via dynamic and static curricular maps *(https://grainger.illinois.edu/academics/undergraduate/majors-and-minors/ce-map/), which include prerequisite sequencing.*

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. See the corresponding section on the Degree and General Education Requirements *(http://catalog.illinois.edu/general-information/degree-general-education-requirements/). ECE 445 *or combination of* ECE 496 & ECE 499 *satisfies a technical core requirement and the Campus General Education Advanced Composition requirement. If ECE 411 is selected as the design course, a separate Advanced Composition course also needs to be selected.*

Free Electives: Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives *(https://go.grainger.illinois.edu/FreeElectives/), so that there are at least 128 credit hours earned toward the degree.*

First Year

First Semester	Hours	Second Semester	Hours
ECE 120	4	ECE 110	3
ENG 100	1	ECE 220	4
MATH 221 (MATH 220 may be substituted)	4	MATH 231	3
Language Other Than English (3rd level) course	4	PHYS 211	4
Composition I or General Education (Choose a Humanities or Social/Behavioral Science course)	4-3	General Education (Choose a Humanities or Social/Behavioral Science course) or Composition I course	3-4
	17		**17**

Second Year

First Semester	Hours	Second Semester	Hours
CS 173	3	ECE 210	4
MATH 257	3	CS 225	4
MATH 241	4	MATH 285	3
PHYS 212	4	PHYS 213	2
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3	PHYS 214	2
	17		**15**

Third Year

First Semester	Hours	Second Semester	Hours
ECE 313	3	ECE 391	4
ECE 385	3	Technical elective course	3
Technical elective course	3	Technical elective course	4
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3	General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3
Free elective course	3	Free elective course	3
	15		**17**

Fourth Year

First Semester	Hours	Second Semester	Hours
ECE 374	4	Design Elective course	4
Technical elective course	3	Technical elective course	3
Technical elective course	4	Technical elective course	3
Free elective course	3	Technical elective course	3
		Free elective course	3
	14		**16**

Total Hours 128

for the degree of Bachelor of Science Major in Computer Engineering

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Student learning outcomes are based on learning outcomes in line with the ABET accreditation process.

Computer Engineering graduates will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

for the degree of Bachelor of Science in Computer Engineering

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Electrical & Computer Engineering Website

Electrical & Computer Engineering Faculty (https://ece.illinois.edu/about/ directory/faculty/)

The Grainger College of Engineering Admissions (https:// grainger.illinois.edu/admissions/)

The Grainger College of Engineering